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STUDY OF ECONOMIC IMPACTS OF POLLUTION CONTROL ON THE IRON FOUNDRY INDUSTRY

PART I - EXECUTIVE SUMMARY

November 30, 1971

for the
Council on Environmental Quality

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November 30, 1971

Mr. Eric Zausner
Contract Officer
Council on Environmental Quality
722 Jackson Place, N.W.
Washington, D.C. 20006

Subject: Study of Economic Impacts of Pollution Control on the Iron Foundry Industry

Dear Mr. Zausner:

In accordance with the request received in a memorandum dated November 9, 1971, we submit herewith 15 copies of our final report covering the subject study. The final report is bound in three volumes, as follows:

I - Executive Summary

II - Structure of the Iron Foundry Industry

III - Economic Impact of Pollution Abatement Upon the Industry

We will be available to come to Washington when required for a final discussion of the study.

Respectfully submitted,

A T Kearney & Company, Inc.

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PART I - EXECUTIVE SUMMARY

A - STRUCTURE OF THE INDUSTRY

DESCRIPTION OF THE IRON FOUNDRY INDUSTRY

For the purposes of this study the iron foundry industry was defined as those shops that melt iron in furnaces, pour the molten iron into molds, and alloy and/or treat the iron in either the molten or cast state, with processes limited to making gray, malleable and ductile iron castings.

The industry is composed of some 1,670 foundries (in 1969) of which 71% were small, 25% medium and only 4% large-sized. The foundries are widely distributed, located in every state, although about half are in the states bordering on the Great Lakes. Approximately 25% of all iron foundries are captive with the remainder being independent, largely producing jobbing type castings.

Most of the foundries are relatively old, although many have been modernized by installing new equipment. Melting is still principally by cupolas, but with output from electric arc and induction furnaces increasing in importance and tonnage.

The pollution problems of the industry are principally in the area of air pollution, largely from melting operations.

Water pollution is principally related to the use of wet scrubbers for air pollution control on cupolas, and for slag quenching on cupolas. Air pollution problems from non-melting operations are more easily controlled, and the emissions are considered to be more of an in-plant environmental problem than an air pollution problem.

DEMAND FOR IRON CASTINGS

Iron castings production has varied widely during the past 10 years, from about 10 million to 15 million tons per year. Although the yearly figures have fluctuated up and down, the general trend has been moderately upward, with a continuing growth projected at 2% per year by weight. Malleable iron output has remained at about one million tons per year, while ductile iron production has shown a steady growth and now exceeds malleable production.

The principal production categories have been cast iron pipe and fittings--representing 23% of product cast; ingot molds with 11%; and miscellaneous castings covering the remaining 66%. However, only 65 foundries produce pipe and molds, resulting in 4% of the foundries producing 34% of tonnage.

The miscellaneous category of iron castings includes all of the malleable and most of the ductile iron output as well as

gray iron castings. The principal users are the automotive and agricultural equipment industries, which account for about 25% of all castings produced.

Markets for iron castings have been projected to increase to approximately 17 million tons per year by 1980. The only area in which competition by other products is expected to be a major consideration is in cast iron pressure and soil pipe. Export markets for iron castings are expected to diminish, and imports are expected to increase, but these represent only a minor factor in the total market.

SUPPLY OF IRON CASTINGS

Iron foundry production processes can be divided into two broad categories: melting and non-melting. The melting operations involve cupolas, electric arc, induction, and reverberatory furnaces, and account for the more important pollution control problems in the iron foundry. The non-melting operations include molding, pouring, shakeout, sand preparation, cleaning, finishing and coremaking. The emissions from these operations are more readily controlled with lower cost, available equipment.

Principal iron foundry raw materials include pig iron, iron and steel scrap, coke, limestone, sand and ferroalloys.

These are all sold through distributors and dealers, and with the exception of pig iron, coke and ferroalloys, are obtained from local sources near foundries. Pig iron, coke and ferroalloys are produced by iron and steel plants located in various parts of the country.

Iron foundry population has declined steadily from 3,200 in 1947, to 1,670 in 1969, and is projected to continue to decline to under 1,000 by 1980. The foundries which have closed, and which are expected to close in the next decade, are primarily the small ones, with the rate of closing increasing as the size declines. The reason for closing is principally lack of capital to modernize and mechanize. The necessity for high capital expenditures for pollution control has been a contributing factor, but has not been the principal reason for the closures.

Iron foundries are located in all states, with greatest concentration in the Great Lakes states. With the exception of the pipe and mold foundries, the vast majority of iron foundries produce a variety of iron castings, mostly on a jobbing basis. Seventy-one percent of the foundries employ fewer than 100, and 50% under 50 employees. The smaller foundries are almost all privately owned. Total employment was about 230,000 in 1968, with average labor input being 23 man-hours per ton of castings. Although almost all levels of skills are

utilized in iron foundries, most of the production labor can be classified as unskilled or semi-skilled.

The very high percentage of iron foundries which are either privately owned, or captive, has resulted in an unavailability of actual financial information regarding costs, capitalization and earnings. The financial analysis was therefore based on data obtained during the 1968 Study of Economic Impact of Air Pollution Controls on the Gray Iron Foundry Industry. Costs of installing and operating emissions controls were also based on the 1970 Systems Analysis of Emissions and Emissions Controls in the Iron Foundry Industry.

The costs of emission control, measured against such factors as sales, total assets, and cost per ton of castings, generally show a declining percentage as the foundry size increases. This puts a greater impact on the smaller foundries, which also accounts for their inability to cope with this cost. The effect on cost of castings varies widely from more than $14 per ton for the smallest foundries, to under $2 per ton for the largest foundries. Except for the smallest foundries, these cost increases are not a significantly high percentage of the castings cost. However, the profit structure of the industry is not sufficiently great enough to permit absorbing of this added cost. Therefore, the cost will have to be passed on to

the castings customers as a price increase. Since the entire industry is faced with the same problem, this should not affect the competitive relationship between foundries. However, it will probably result in some losses to competitive materials in pipe products, and to imported castings.

Technological changes which are taking place in the iron foundry industry involve almost every area of activity, but are primarily concentrated in three general directions: melting; mechanization and automations; and pollution and environmental control. Although the first two result in lower labor costs and higher productivity, the high capital costs involved in all areas have resulted in an acceleration of the rate of closing of small foundries.

The effect of government influence, both federal and local, on iron castings purchases is minimal, since very few iron castings are bought directly by governments. The one exception to this is in cast iron pipe, where government specifications and cost control tend to promote lower cost, competitive products.

B - OVERALL IMPACT ON INDUSTRY

PRICE INCREASES

Price increases, caused by need to cover the costs of installing and operating pollution controls in iron foundries, will have some effect in promoting use of competitive products

and materials over iron castings, particularly in pressure and soil pipe. It will also, at least temporarily, have an adverse effect on the foreign balance of trade, by reducing exports and increasing imports of iron castings.

Competition within the iron foundry industry will be affected to only a limited degree since all foundries are faced with the same need for installing pollution controls. However, the need for higher increases among the very small foundries will undoubtedly adversely affect their competitive position, and will result in increased closings among small shops.

FACTOR DISLOCATIONS WITHIN INDUSTRY

The rate of closing of small foundries, which has been undiminished for the past 25 years, is expected to continue at least for the next 10 years. The reasons have been economic--principally the need for capital expenditures to replace equipment, reduce labor costs, and increase productivity. The added need for high cost pollution controls, which yield no return on investment and, in fact, actually increase operating costs, has resulted in an acceleration in the rate of closing of the smaller foundries. The number of foundries with fewer than 20 employees which manage to survive by 1980 will be very small, probably under 100, compared with over 700 only 10 years

ago. The older foundries, and those which are still manually operated, will also experience a high percentage of closures.

The high rate of closings among the small foundries is expected to be about the same for both captive and independent shops, since the economics are generally the same for both. The closings will be primarily among the jobbing type foundries producing miscellaneous iron castings.

EFFECTS ON
RELATED INDUSTRIES

For the most part, the closings of the small, jobbing type iron foundries will have relatively little effect on castings buyers, other than the nuisance of having to change source of supply. Generally, other foundries will be found within trucking distances of the closed shops. Although isolated cases may arise where another foundry will not be located nearby, or where capacity of the neighboring foundries will not be adequate to pick up the business of the closed shops, the overall iron foundry capacity has been found to be double the total castings production. Since the foundries which are expected to close are primarily small ones with low capacity, the total displaced tonnage is not expected to be great in relation to the total available capacity. The principal problems will be caused by the fact that as the very small jobbing foundries disappear, there will be few foundries left which are

willing to take small orders for one or two special castings.

Most foundries obtain their metallic and non-metallic raw materials from suppliers and dealers located in their general areas. These in turn get their materials from steel plants, refractory firms, quarries and similar companies. The principal exceptions are the scrap dealers who are located in every community, and who buy local scrap, process it and sell it to foundries. Since the total foundry tonnage is expected to continue to grow, the closing down of individual foundries is not expected to have any national effect on suppliers. Local dealers and supply firms may be affected if the only foundry in an area closes down, but most of them will continue to supply the same materials to other foundries in the area.

INDUSTRY DISLOCATIONS

The net effect of the continuing decrease in the number of iron foundries, while the total castings tonnage has continued to grow, has been to increase the average output per foundry from 3,800 tons per year in 1947 to 8,700 tons in 1969, and project to 16,500 tons in 1980. This further illustrates the rapid disappearance of the small foundries.

The effect of adding pollution control costs to other foundry costs has been estimated to result in price increases from $2 per ton of castings for large, specialty foundries

to $14 for small, jobbing foundries. In products such as pipe and molds, which are sold as finished products directly to consumers, this increase is a direct raise in cost of final product. However, for most jobbing castings, which constitute only a small percentage of the weight of the product in which they are used, the overall effect on the final product cost is relatively minor.

The principal effect of the closing of foundries is expected to be in local employment, and to a lesser degree on national employment. An estimated distribution of foundry closures has been made, resulting in a state-by-state analysis of the effect on employment. The total number of employees estimated to be in the foundries which are projected to close in the next 10 years is 26,630 or about 11% of total foundry employment. Approximately half of this number, or their equivalent, are estimated will be re-employed in other iron foundries, which will increase their business to replace that given up by the closed foundries. The net unemployment is therefore estimated to be approximately 13,300. However, it is noted that most of these foundries were expected to close for other reasons than need for installing pollution controls, and that this factor only accelerated the rate of closings. The skilled workers who are dislocated can probably find employment in other industries.

However, since the majority of foundry workers are semi-skilled or unskilled, a need will exist for retraining and, in some cases, relocation to new areas.

The estimated expenditures for air pollution control in iron foundries are $24 million in 1972, increasing annually to $131 million in 1975, after which the controls are assumed to have been largely installed and annual expenditures will drop off. The major problem facing foundries has been identified as the raising of capital funds for installation of controls, a nonproductive expense. This is not caused by the lack of total investment capital, since foundry control expenditures are only a small fraction of one percent of the total public capital market. It represents, instead, a problem of financing nonproductive expense in companies where the earnings history has always been marginal.

It is likely, therefore, that special inducements may have to be provided by various levels of government to assist and encourage foundries to make the necessary expenditures rather than closing their doors. Of the many alternates which have been considered, those which are most likely to be successful have been identified as subsidiaries or grants covering large portions of the capital investment for pollution control, and/or large direct offset charges against income taxes.

LOCATIONS OF DISLOCATIONS

Estimates of closures of iron foundries were made by size of foundry, and by location in the U.S. As the size decreases, the percentage of the foundries in the size category is expected to increase from zero in the largest size group to as high as 80% in the smallest. These closings will be in all areas of the country, but will be highest in the industrial areas where the greatest concentrations of foundries now exist. For example, the Great Lakes states are expected to account for almost half of the total foundry closings, and resulting unemployment. The other principal areas to be affected are expected to be Birmingham and Los Angeles, both of which have high iron foundry concentrations.

COMPENSATORY FACTORS

Because iron castings output is expected to continue to grow, even though many iron foundries will close, the overall effect on the industry will not be as catastrophic as might otherwise be expected. Raw materials will continue to be required in undiminished quantities, and castings customers will continue to be supplied in spite of some local inconveniences. Even the unemployment, created by closing of many small foundries, will be partially compensated for by the need for many surviving foundries to expand to pick up the displaced castings tonnage;

therefore, they will hire additional workers. About half of the labor force in the closed foundries, or their equivalent, is expected to be re-employed by other iron foundries. A portion of the balance will undoubtedly be re-employed by other industries in the same localities.

NET EMPLOYMENT IMPACT

It has been estimated that of the 13,300 workers who are projected to be unemployed as a result of iron foundry closures in the next decade, those having skills which are also used in other industries will become employed again. However, the majority of foundry workers are either so specialized or unskilled that retraining will be necessary to provide employment for them.

IMPACT ON LOCAL ECONOMY

The widespread distribution of iron foundries, and the location of foundries in almost every community, are expected to create a local, rather than a national, problem; this will be particularly true where a small foundry is practically the only industry in a community. In these cases, relocation of some workers to other communities will be necessary. With the possible exception of some scrap yards serving isolated communities where a foundry closes, the effect of iron foundry closures on supplier industries in most areas is expected to be very minor.

C - SOURCES OF DATA

The principal sources from which the data for this economic impact study were taken are given in the following tabulation.

Sources of Data and Acknowledgements

1. American Foundrymen's Society, unpublished data.

2. BDSA-NAPCA Gray Iron Foundry Air Pollution BSDAF-807, 1968.

3. Cooperative Wage Bureau, Benchmark and Specimen Example Job Descriptions and Classifications.

4. Gray and Ductile Iron Founders' Society, unpublished data.

5. A. T. Kearney & Company, Systems Analysis of Emissions and Emissions Control in the Iron Foundry Industry.

6. National Foundry Association, National Survey of Wages and Fringe Benefits in the Foundry Industry, January, 1971.

7. Penton Publishing Co., Foundry Magazine, Statistical Inventory and Marketing Data.

8. U.S. Department of HEW, Public Health Service, Economic Impact of Air Pollution Controls on Gray Iron Foundry Industry, AP-74.

9. U.S. Department of Commerce, Bureau of the Census, Current Industrial Reports, Census of Manufactures, Import-Export Data, and Industry Profiles.